

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A locknut with a deformable member, comprising:

(a) a metal threaded nut body with a central axis and a top end having a top surface, the metal nut body having a first metal density;

(b) the threaded nut body having a plurality of internal threads defined along a first radius from the central axis, the plurality of threads defining a threaded body length dimension along the central axis having a top end, the plurality of threads further having a common thread diameter having a radius dimension, wherein the threaded body length dimension is about equal to the thread diameter;

(c) an aperture forged at the nut body top end about the central axis and having a first volume dimension, the aperture defined by a plurality of forged splines disposed in a circular array about the central axis and an actuating wall;

(d) each of the plurality of splines further having a first and second sidewall meeting to form an engagement edge, the engagement edges arrayed along an edge radius about the central axis and larger than the first thread diameter radius, wherein the spline first and second sidewalls and engagement edges and the actuating wall have a second metal density, the second metal density higher than the nut body first metal density;

(e) a plurality of spline voids each defined between the first and second sidewalls of adjacent splines; and

(f) a deformable locking member having a second volume dimension larger than the aperture first volume and inserted within said aperture and having an outer surface engaged by the engagement edges, a top workpiece engagement surface, a cylindrical inner surface and a bottom actuating surface, wherein the outer surface is disposed on an outer surface radius about the central axis and larger than the edge radius;

wherein the deformable member is configured to deform and substantially flow into the spline voids and into the threads of a workpiece bolt when the member is tightened onto a workpiece bolt until the member top surface is compressively engaged by a workpiece surface and the member bottom actuating surface is compressively engaged by the aperture actuating

wall, the member thereby exerting expansion locking forces against the workpiece bolt threads;
and

wherein the deformable member is configured to remain engaged by the spline sidewalls and edges and rotate with the locknut when the locknut is loosened about the workpiece bolt.

2. (Original) The locknut of claim 1 wherein the deformable member is formed from a material selected from the group consisting of polypropylene, polytetrafluoroethylene, and a copper metallic compound.

3. (Original) The locknut of claim 2 wherein the expansion locking forces exerted against the workpiece bolt threads by the deformable member may be increased or decreased by tightening or loosening the locknut about the workpiece bolt.

4. (Original) The locknut of claim 1 wherein the member further deforms and flows into an interface region between the locknut top surface and a workpiece surface, the member thereby forming a vibration absorbing member between the locknut and the workpiece.

5. (Original) The locknut of claim 1 wherein the member further deforms and flows into an interface region between the locknut top surface and a workpiece surface, the member thereby forming a sealing member between the locknut and the workpiece.

6. (Original) The locknut of claim 1 wherein the deformable member cylindrical inner surface has an inner surface radius greater than the thread radius.

7. (Currently amended) A method for locking a nut onto a bolt, comprising the steps of:

- (a) providing a metal nut body with a first metal density, the nut body having with a central axis and top and bottom ends and ~~having a top surface~~;
- (b) forging a plurality of splines on a circular array about the central axis and an actuating wall through a portion of the top surface on the nut body top end, each of the

plurality of splines having a first and second sidewall meeting to form an engagement edge, the engagement edges arrayed along an edge radius about the central axis, the circular array of splines and the actuating wall defining an aperture about the central axis having a first volume dimension, wherein the spline first and second sidewalls and engagement edges and the actuating wall have a second metal density, the second metal density higher than the nut body first metal density;

- (c) the splines further defining a plurality of spline voids between the first and second sidewalls of adjacent splines;
- (d) internally threading the nut body with a plurality of internal threads from the actuating wall to the nut body bottom end, the threads having a common thread diameter having a radius dimension defined from the central axis and smaller than the edge radius, the threads further defining a threaded body length dimension along the central axis from the actuating wall end to the nut body bottom end, the body length dimension about equal to the thread diameter;
- (e) forming a resilient deformable locking member having a top workpiece engagement surface, a cylindrical inner surface having an inner radius, a deformable outer surface defined on an outer radius larger than the spline edge radius, and a bottom actuating surface, and further having a second volume dimension larger than the aperture first volume dimension;
- (f) inserting the resilient deformable locking member into the aperture and thereby the member outer surface into compressive contact with the spline engagement edges, the deformable member;
- (g) threading the nut body onto a bolt having a corresponding thread diameter;
- (h) rotating the nut body about the bolt and thereby causing the nut body to travel along the bolt until the deformable member top workpiece engagement surface engages a workpiece surface;
- (i) further rotating the nut body about the bolt, the deformable member thereby compressively engaging the spline engagement edges, the actuating wall, the workpiece surface and the bolt threads;

- (j) deforming and cold-flowing the deformable member inner surface into and about the bolt threads and the deformable outer surface about the spline walls and into the spline voids responsive to said compressive engagement; and
- (k) the cold-flowed deformable member exerting expansion forces against said spline engagement edges, actuating wall, workpiece surface bolt threads and spline walls, thereby providing frictional locking forces locking the nut body into a fixed position relative to the bolt;

wherein the deformable member is configured to substantially flow into the spline voids sufficient to cause the cold-flowed member to remain engaged by the spline voids and rotate with the nut body when the nut body is loosened about the bolt.

8. (Original) The method of claim 7 wherein the step of forming the resilient deformable locking member further comprises the step of selecting a material from the group consisting of polypropylene, polytetrafluoroethylene, and a copper metallic compound.

9. (Original) The method of claim 8 further comprising the step of increasing the cold-flowed member expansion forces exerted against the bolt threads by further tightening the nut about the bolt.

10. (Original) The method of claim 7 further comprising the step of decreasing the cold-flowed member expansion forces exerted against the bolt threads by loosening the nut about the bolt.

11. (Original) The method of claim 7 wherein the step of further deforming and cold-flowing the deformable member outer surface further comprises the step of flowing a portion of the deformable member into an interface region between the nut top surface and a workpiece surface, the member thereby forming a vibration absorbing member between the locknut and the workpiece.

12. (Original) The method of claim 7 wherein the step of further deforming and cold-flowing the deformable member outer surface further comprises the step of flowing a portion of the deformable member into an interface region between the nut top surface and a workpiece surface, the member thereby forming a sealing member between the locknut and the workpiece.

13. (Original) The method of claim 7 wherein the deformable member cylindrical inner surface radius is greater than the thread radius.

14. (Previously added) The locknut of claim 1 wherein the splines and spline voids are generally triangular in shape;
the spline sidewalls are generally planar;
the spline engagement edges generally linear;
the sidewalls defining the spline voids forming an angle with a value of from about 60 to about 120 degrees; and
the engagement edges are arrayed with a pitch value per inch of between about 10 to about 24.

15. (Previously added) The locknut of claim 14 wherein the linear spline engagement edges have an edge length of about one-sixteenth of an inch, and the threaded body length is about one-half inch.

16. (Previously added) The locknut of claim 14 wherein the linear spline engagement edges have an edge length of about three-sixteenth of an inch;
the threaded body length is about two inches;
the spline void sidewall angle is about 90 degrees; and
the pitch value is about 14.

17. (Previously added) The method of claim 7 wherein the splines and spline voids are generally triangular in shape;

the spline sidewalls are generally planar;
the spline engagement edges generally linear;
the sidewalls defining the spline voids forming an angle with a value of from about 60 to about 120 degrees; and
the engagement edges are arrayed with a pitch value per inch of between about 10 to about 24.

18. (Previously added) The method of claim 17 wherein the linear spline engagement edges have an edge length of about one-sixteenth of an inch, and the threaded body length is about one-half inch.

19. (Previously added) The method of claim 17 wherein the linear spline engagement edges have an edge length of about three-sixteenth of an inch;
the threaded body length is about two inches;
the spline void sidewall angle is about 90 degrees; and
the pitch value is about 14.

20. (New) A locknut with a deformable member, comprising:

(a) a metal threaded nut body with a central axis and a top end having a top surface, the top end having a metal grain flow contour structure;

(b) the threaded nut body having a plurality of internal threads defined along a first radius from the central axis, the plurality of threads defining a threaded body length dimension along the central axis having a top end, the plurality of threads further having a common thread diameter having a radius dimension, wherein the threaded body length dimension is about equal to the thread diameter;

(c) an aperture at the nut body top end about the central axis and having a first volume dimension, the aperture defined by a plurality of splines disposed in a circular array about the central axis and an actuating wall;

(d) each of the plurality of splines further having a first and second sidewall meeting to form an engagement edge, the engagement edges arrayed with a pitch value per inch of between about 10 to about 24 along an edge radius about the central axis and larger than the first thread diameter radius, wherein the spline first and second sidewalls and engagement edges and the actuating wall are formed with the top end metal grain flow contour structure;

(e) a plurality of spline voids each defined between the first and second sidewalls of adjacent splines; and

(f) a deformable locking member having a second volume dimension larger than the aperture first volume and inserted within said aperture and having an outer surface engaged by the engagement edges, a top workpiece engagement surface, a cylindrical inner surface and a bottom actuating surface, wherein the outer surface is disposed on an outer surface radius about the central axis and larger than the edge radius;

wherein the deformable member is configured to deform and substantially flow into the spline voids and into the threads of a workpiece bolt when the member is tightened onto a workpiece bolt until the member top surface is compressively engaged by a workpiece surface and the member bottom actuating surface is compressively engaged by the aperture actuating wall, the member thereby exerting expansion locking forces against the workpiece bolt threads;
and

wherein the deformable member is configured to remain engaged by the spline sidewalls and edges and rotate with the locknut when the locknut is loosened about the workpiece bolt.